

What is claimed is

1. An image processing device comprising:

an image area extracting part for extracting a plurality of image areas from image data;

5 a positional information recognizing part for recognizing positional information of each extracted image area;

an attribute recognizing part for recognizing at least attributes concerning whether each extracted image area is  
10 a filled closed area or an unfilled closed area;

a file producing part for producing a file by synthesizing said image areas based on the positional information recognized by said positional information recognizing part; and

15 a sequence setting part for setting up overlaying sequence for each image area in accordance with the recognition result of said attribute recognizing part,

wherein said file producing part produces the file by overlaying said image areas in accordance with the overlaying  
20 sequence set up by said sequence setting part.

2. An image processing device according to the claim 1, wherein said sequence setting part sets up the overlaying sequence to overlay unfilled closed areas in front of filled closed areas.

3. An image processing device according to the claim 2, wherein said attribute recognizing part further recognizes whether each extracted image area is a line area that does not form any closed area, and

5        said sequence setting part sets up the overlaying sequence to overlay line areas in front of filled closed areas in accordance with the recognition result of said attribute recognizing part.

4. An image processing device according to the claim 1, wherein said image area extracting part comprises a first  
10        extracting part for extracting text image areas, graphic image areas, and photographic image areas from image data, and a second extracting part for extracting filled closed areas, unfilled closed areas, and line areas that do not form any  
15        closed areas from the extracted graphic image areas;

      wherein said attribute recognizing part recognizes attributes concerning whether each extracted image area is a text image area, a photographic image area, a filled closed area, an unfilled closed area or a line area; and

20        said sequence setting part sets up the overlaying sequence for each image area of text image areas, photographic image areas, filled closed areas, unfilled closed areas, and line areas in accordance with the recognition results of said attribute recognizing part.

5. An image processing device according to the claim 4,  
wherein said sequence setting part sets up the overlaying  
sequence to overlay text image areas in front, filled closed  
areas and photographic image areas in back, and unfilled closed  
5 areas and line areas in between them.

6. An image processing device according to the claim 5,  
further comprising an image area overlapping discriminating  
part for discriminating whether at least a part of either  
filled closed areas or photographic image areas are  
10 overlapping each other;

wherein said sequence setting part further sets up an  
overlaying sequence for filled closed areas and photographic  
image areas, depending on the result of a comparison of the  
sizes of filled closed areas and photographic image areas,  
15 or the number of overlapping areas, when at least some of  
the filled closed areas and photographic image areas are  
overlapping.

7. An image processing device according to the claim 4,  
wherein said second extracting part comprises,

20 a vector transforming part for transforming image data  
in graphic image areas into vector data;

a closed area extracting part for extracting closed areas  
based on the connection relation of a plurality of vector  
data;

a color information judging part for judging whether the color information of internal points and external points of the extracted closed areas are the same; and

a filled closed area detecting part for detecting filled  
5 closed areas based on the judgment results of the color information judging part.

8. An image processing device according to the claim 1, further comprising a document scanning unit for scanning documents to obtain input image data,

10 wherein said image area extracting part extracts a plurality of image areas from the input image data obtained by scanning the documents.

9. An image processing method comprising the steps of:  
extracting a plurality of image areas from image data;  
15 recognizing positional information of each extracted image area;

recognizing at least attributes concerning whether each extracted image area is a filled closed area or an unfilled closed area;

20 producing a file by synthesizing said image areas based on positional information recognized; and

setting up overlaying sequence for each image area in accordance with the recognition result of the attributes,

wherein said producing step includes producing file by

overlying said image areas in accordance with the overlying sequence, which has been set up.

10. An image processing method according to the claim 9, wherein said setting up step includes setting up an overlying  
5 sequence to overlay unfilled closed areas in front of filled closed area.

11. An image processing method according to the claim 10, wherein said step of recognizing attributes includes recognizing whether each extracted image areas is a line area  
10 that does not form any closed areas, and

wherein said setting step includes setting overlying sequence to overlay line areas in front of filled closed areas.

12. An image processing device according to the claim 9, wherein said extracting step includes a first extracting step  
15 of extracting text image areas, graphic image areas, and photographic image areas from image data, and a second extracting step of extracting filled closed areas, unfilled closed areas, and line areas that do not form any closed areas from the extracted graphic image areas;

20 wherein said step of recognizing attributes includes recognizing attributes concerning whether each extracted image area is a text image area, a photographic image area, a filled closed area, an unfilled closed area or a line area; and

said setting up step includes setting up the overlaying sequence for each image area of text image areas, photographic image areas, filled closed areas, unfilled closed areas, and line areas in accordance with the recognition results of the attributes.

13. An image processing method according to the claim 12, wherein said setting up step includes setting up the overlaying sequence to overlay text image areas in front, filled closed areas and photographic image areas in back, and unfilled closed areas and line areas are in between them.

14. An image processing method according to the claim 13, further comprising a step of discriminating whether at least a part of either filled closed areas or photographic image areas are overlapping each other;

15 wherein said setting up step includes setting overlaying sequence for filled closed areas and photographic image areas, depending on the result of a comparison of the sizes of filled closed areas and photographic image areas, or the number of overlapping areas, when at least some of the filled closed areas and photographic image areas are overlapping.

15. An image processing method according to the claim 12, wherein said second extracting step comprises,

a step of transforming image data in graphic image areas into vector data;

a step of extracting closed areas based on the connection relation of a plurality of vector data;

a step of judging whether the color information of internal points and external points of the extracted closed areas are the same; and

a step of detecting filled closed areas based on the judgment result of whether the compared color information is the same.

16. An image processing device according to the claim 9, further comprising a step for scanning documents to obtain input image data,

wherein said extracting step includes extracting a plurality of image areas from the input image data obtained from documents.

17. A computer program used for image processing, executing the procedures of:

extracting a plurality of image areas from image data;

recognizing positional information of each extracted image area;

recognizing at least attributes concerning whether each extracted image area is a filled closed area or an unfilled closed area;

producing a file by synthesizing said image areas based on positional information recognized; and

setting up overlaying sequence for each image area in accordance with the recognition result of the attributes,

wherein said producing procedure includes producing file by overlaying said image areas in accordance with the overlaying sequence, which has been set up.

18. A computer program according to the claim 17, wherein said setting up procedure includes setting up an overlaying sequence to overlay unfilled closed areas in front of filled closed areas.

10 19. A computer program according to the claim 18, wherein said procedure of recognizing attributes includes recognizing whether each extracted image area is a line area that does not form any closed area, and

wherein said setting procedure includes setting overlaying to overlay line areas in front of filled closed areas.

20. A computer program according to the claim 17, wherein said extracting procedure includes a first extracting procedure of extracting text image areas, graphic image areas, and photographic image areas from image data, and a second extracting procedure of extracting filled closed areas, unfilled closed areas, and line areas that do not form any closed areas from the extracted graphic image areas;

wherein said procedure of recognizing attributes



includes recognizing attributes concerning whether each extracted image area is a text image area, a photographic image area, a filled closed area, an unfilled closed area or a line area; and

5        said setting up procedure includes setting up the overlaying sequence for each image area of text image areas, photographic image areas, filled closed areas, unfilled closed areas and line areas in accordance with the recognition results of the attributes.

10    21. A computer according to the claim 20, wherein said setting up procedure includes setting up the overlaying sequence to overlay text image areas in front, filled closed areas and photographic image areas in back, and unfilled closed areas and line areas are in between them.

15    22. A computer program according to the claim 21, further comprising a procedure of discriminating whether at least a part of either filled closed areas or photographic image areas are overlapping each other;

20        wherein said setting up procedure includes setting overlaying sequence for filled closed areas and photographic image areas, depending on the result of a comparison of the sizes of filled closed areas and photographic image areas, or the number of overlapping areas, when at least some of the filled closed areas and photographic image areas are

overlapping.

23. A computer program according to the claim 20, wherein said second extracting procedure comprises,

5 a procedure of transforming image data in graphic image areas into vector data;

a procedure of extracting closed areas based on the connection relation of a plurality of vector data;

10 a procedure of judging whether the color information of internal points and external points of the extracted closed areas are the same; and

a procedure of detecting filled closed areas based on the judgment result of whether the compared color information is the same.

24. A computer program according to the claim 20, further comprising a procedure for scanning documents to obtain input  
15 image data,

wherein said extracting procedure includes extracting a plurality of image areas from the input image data obtained from documents.